Post-Graduate Syllabus in Economics with Rural Development:

STRUCTURE OF THE SYLLABUS:

No. of Papers – 16 with each paper of Full Marks 50. Except paper XV and XVI , each paper of 50 marks includes 10 marks of Internal Assessment. Except paper XV and XVI, each paper consists of two groups of 25 marks including internal assessment of 5 marks for each group. There are no internal assessments for paper XV and paper XVI.

Distribution of Marks:

For paeprs I to XIV:
Group A (25 Marks): 2 Marks *2 + 6 Marks*1 + 10 Marks*1 + Internal Assessment – 5 marks
Group B (25 Marks): 2 Marks *2 + 6 Marks*1 + 10 Marks*1 + Internal Assessment – 5 marks

Paper – XV :Theory 30 (2 Marks*5+ 5 marks*2 + 10 marks*1) , Practical 20
Paper –XVI : Dissertation Paper -30 Marks, Viva Voce – 20 Marks

Semester -I
Paper-I (ECO101): Economic Thought
Paper –II (ECO102): Indian Economy
Paper-III (ECO 103): Microeconomics
Paper IV (ECO 104)Quantitative Economics I [Techniques in Quantitative Economics]

Semester -II
Paper V (ECO 201): Macroeconomics I [Macroeconomic Theory]
Paper VI (ECO202): Macroeconomics II [Growth Economics]
Paper VII(ECO-203): Environmental Economics, Public Choice and Public Economics
Paper VIII (ECO – 204) Quantitative Economics II [Statistics and Econometrics]

Semester -III
Special Paper - Econometrics
Paper – IX (ECO 301E): Econometrics I
Paper – X (ECO 302E): Econometrics II
Paper – XI (ECO 303E): Econometrics III
Paper – XII (ECO 304E): Econometrics IV

Special Paper – Agricultural Economics
Paper – IX (ECO 301A): Agricultural Economics I
Paper – X (ECO 302A): Agricultural Economics II
Paper – XI (ECO 303A): Agricultural Economics III
Paper – XII (ECO 304A): Agricultural Economics IV

Semester -IV
Paper – XIII (ECO-401): Rural Development: Theory and Experience
Paper – XIV (ECO-402): International Trade and Finance
Paper – XV (ECO-403): Computer Application in Economics 50 Marks (Theory 30, Practical 20)
Paper –XVI (ECO-404): Dissertation (Dissertation Paper -30 Marks, Viva Voce – 20 Marks)

Post-Graduate Syllabus in Economics with Rural Development

SEMESTER- I
Paper-I (Code- ECO101): Economic Thought
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)

Adam Smith: An overview of Classical Political Economy and the marginalist school of 1870 – Contrasting features; The doctrine of division of labour; Smith's theory of labour; Wages, Profit and Rent; The Accumulation of Stock.

David Ricardo: Smith's historical vision contrasted with Ricardo's origin in typicality, Theory of value; Theory of distribution – Its importance in the Ricardian system- rent, wages and profit; A perspective on the relation between wages and profits – wage profit perspectives in relation to Sraffa's rehabilitation; On machinery including Hick's observation in Economic Perspective

Group B: 25 Marks (Written -20, Internal Assessment -05)

Karl Marx: General Introduction; Theory of Value; Circulation and Production; Theory of surplus value Value composition of commodities; Capital circuits and reproduction schemes; Simple reproduction; Extended reproduction; Transformation problem; Falling rate of profit.

References :

a) Smith, A. (1776), *An Inquiry into the Nature and Causes of The Wealth of Nations,* University of Chicago Press,USA.

b) David, R. (1821), *Principles of Political Economy and Taxation* , John Murray, Londan.

c) Marx, K. (1894), *Das Kapital,* 3rd Edition, Otto Meisener Publishers, Verlagvon.

d) Bohm- Bawerk.(1949), *Karl Marx and the closed of his system*, Augustus M. Kelley, New York.

f) Mandal, Ernest (1971), *Formation of economic thought of Karl Marx 1843 to Capital*, Monthly Review Press Classics

g) Blaug, M. (1983), *Economic Theory in Retrospect*, 4th Edition, Cambridge University Press, Cambridge.

h) Dasgupta, A.K (1985), *Epochs of Economic Theory*, Basil Blackwell, Great Britain.

i) Paul, R.R.(1979), *History of Economic Thought*, 3rd Edition, Kalyani Publishers, New Delhi.

j) Roll, E. (1953), *A History of Economic Thought*, Faber and Faber Ltd, London.

k) Schumpeter, J.A. (1954), *History of Economic Analysis*, Harvard University Press,London

l) Sweezy, P. (1991), *The Theory of Capitalist Development*, KP Bagchi & Co., New Delhi.

Paper –II (ECO102): Indian Economy
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)

1. Industrial Sector of Indian Economy:-Growth & Diversification (Growth in 1990's, Recovery since 2002-03, Growth since 2007-08), Industrial policy in 12th Plan, Productivity Trends in the manufacturing sector, Industry-Environment linkages. SSi and Globalization, Challenges & Outlook.

2. Financial Sector:-Reforms and its impact, Financial Performance of Banks, NBFI, Capital Market, Major Policy Initiatives, Challenges and Outlook.

3. Foreign Trade Sector (BOP) :Reforms and its impacts, BOP in India, FER & FDI, External Debt, Exchange Rate, India's Merchandise & services Trade, WTO & India, Current & Capital account Convertability, Challenges & outlook.

Group –B: 25 Marks (Written -20, Internal Assessment -05)

1) Macro Perspective of the Indian Economy – growth, investment & capital formation and price etc.

2) Resource Management and Agricultural Growth – Technological change in agriculture, problem of irrigation, soil degradation and declining productivity.

3) Employment and unemployment situation in India – Trend and patterns of employment and unemployment, Interrelationship between Growth and Employment, Economic reforms and Informal sector.

4) Poverty and Inequality in India – Alternative approaches of poverty; GDP Growth, poverty and Inequality, economic reforms and poverty.

References :
Group –A

a) Dutta and Ruddar (2003), Economic Reforms, labour and employment, Deep and Deep Publication.
b) Sandesera, J.C. (1992) Industrial Policy and Planning: 1947-1951, Sage Publication.
c) Kapila, Uma (ed) Indian Economy since Independence, Academic Foundation
d) Sen, Rajkumar (ed), 2005, Social Sector Development in India, Deep and Deep
e) Joshi, V, and Little, I.M.D. India's Economic Reforms: 1991-2001,OUP
f) Govt. of India Economic Survey 2004-05.
g) Bhagwati, J. 2004; In Defense of Globalization, OUP.
h) Tisdell, Clem and Sen, Rajkumar (ed): economic Globalization, 2004

Group -B
1. Bhagwati, J. and A. Panagaria (2012), *India's Tryst with Destiny*, Collins Business.
2. Marjit, S. and S. Kar (2008), *The Outsiders*, Oxford University Press.
3. R. Lucas & G.I. Papanek (*ed*) (1998), *The Indian Economy – Recent Development and Future Prospects*, Oxford.
4. V. Joshi & I. M. D. Little (2003), *India's Economic Reforms—1991-2001*, Oxford.

5. I.J. Ahluwalia and I.M.D. Little (2003), *India's Economic Reforms and Development—Essays for Manmohan Singh*, Oxford, 2003.
6. Jalan, B. (ed) "The Indian Economy – Problem and Prospects", Penguin Books.
7. Uma, K. (ed.) Indian Economy since Independence, Academic Foundation.
8. D. Narasimha Reddy & Srijit Mishra(ed) "Agrarian Crisis in India", Oxford, 2011.
9. Rao,C.H.H. "Agricultural growth, sustainability and Poverty alleviation", EPW, 1998, July18.
10. Nayar, G. "Growth and Poverty in Rural India", EPW,2005, April16.
11. K. Sundaram and Suresh D. Tendulkar, "Poverty in India in the 1990s" EPW, 2003,April.
12. M.S. Ahluwalia, "Prospects and Policy change in the Twelfth plan", EPW, 2011, May21.
13. Abhijit Sen and Himansu, "Poverty and inequality in India" I & II EPW 2004, Sept, 18&25.
14. Sasma, Joydeb.(2012) "Resource and Technology as Constraints to growth in agriculture—The India Experience", International Journal of Arts & Science (conference proceedings), Paris.
15. Economic Survey(2013), Govt. of India, Oxford University Press.
16. India Development Reports (2013), IGIDR, Oxford University Press.
17. Das, Pinaki (2012), 'Growth Trajectory and Its Implications for Employment in India', *Indian Journal of Economics*, Special Issue, 2012.
18. Das, Pinaki (2012), 'Trends of Employment in India: Reflections from Recent NSS Data', *Vidyasagar University Journal of Economics*, Vol. XVI.
19. Papola, T.S. (2012), Employment Growth in the Post-Reform Period, Keynote Paper, ISLE (54), 2012
20. Lee, S. and M. Gerecke, 'Inequality and Economic Growth: Revisiting Kuznetsian Political Economy of Inequality', ILO, 2012.
21. Patnaik, U. (2007), 'Neoliberalism and Rural Poverty in India', EPW, July 28, 2007.
22. Himangshu (2007), 'Recent Trends in Poverty and Inequality: Some Preliminary Results', EPW, 10 February.

Paper-III (ECO 103): Microeconomics
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)

1. Role of Economic Organisation in the functioning of Economy
2. Existence and Nature of Firm
3. Market Economy, Pareto Optimality, General Equilibrium and Partial Equilibrium
4. Analysis of Market Failure
5. The Optimum Firm
6. Financial Decision making of Firm

Group –B: 25 Marks (Written -20, Internal Assessment -05)

1. Concept of Natural Monopoly, Review of Theory of Oligopoly.
2. Concentration, Concentration Measures, Efficiency, Profitability and Growth, Mergers, Entry Barriers, Entry Deterrence, Contestable Markets.
3. Study of Organisational Structure of Some Selected Industries in India (atleast one in detail)- Jute, Iron and Steel, Pharmaceuticals, Textiles, Engineering goods, IT industry, etc.

References:
Group -A
   a) Coase, R. H., The Nature of the Firm, Economica 1937,
   b) Alchian, A. and Demsetz, H. Production, Information Cost and Economic Organisation, American Economic Review, 1972,
   c) Arrow, K. J., Limits to Economic Organisation
   d) Robinson, E. A. G., Structure of the Competitive Industry
   e) Bator, F. M., An Anatomy of Market Failure, Quarterly Journal of Economics, 1958.
   f) Marris, R. L. The Theory of Managerial Capitalism.
   g) Koutsoyiannis, A. Non-Price Decisions, Ch. 8-10.

Group -B
1. Shy, O.: Industrial Organization, The MIT Press, 1995.
2. Tirole, J: The Theory of Industrial Organization, The MIT Press, 1988.
3. Basu, K.: Lectures in Industrial Organisation Theory. Basil Blackwell Oxford, 1988.
4. Chakrabarty, S.P.: Issues in Industrial Economics, Avebury Publishing, 1995.
5. Varian H.: Microeconomic Analysis, W.W. Norton & Company, 1992.
6. Martin,S.: Advanced Industrial Economics. Blackwell, 1993.
7. Hay, D. A., and D.J. Morris: Industrial Economics and organization: Theory and Evidence, Oxford University Press, 1991.
8. Sen, Gokarn & Vaidya: The Structure of Indian Industry, Oxford University Press, 2003.
9. Mascollel,A., Whinston, M. and Green, J.: Microeconomic Theory, Oxford University Press , First Indian Edition, 2006.

Paper IV (ECO 104)Quantitative Economics I [Techniques in Quantitative Economics]
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)

1. Review of Classical Constrained Programming and Linear Programming, Maximum (and Minimum) Value Functions and the Envelope Theorem, Duality and the Envelope Theorem.

2. Nonlinear Programming-Nature, Kuhn-Tucker Conditions, Graphical Solution, The Constraint Qualification, Sufficiency Theorems, Saddle-Point Theorem, Economic Applications.

3. Real Analysis-Sets and set operations, Cartesian product of sets, Relation on a Set, Order relations, Functions, One-to-one and onto functions, Bijective functions, Natural Numbers, Integers, Rational Numbers, Real Numbers.

Group –B: 25 Marks (Written -20, Internal Assessment -05)

1. An Outline of Game Theory:

A. Introductory Game Theory
B. Normal Form Games - Pure Strategies, Dominance, Nash equilibrium, Finite Normal Form Game, Cournot Oligopoly, Mixed Strategies- construction, existence and interpretation,
C. Extensive Form Games- Subgame Perfect Equilibrium, finite extensive form games, the Limits of Backward Induction
D. Concept of Infinitely repeated games – Folk Theorem
E. Introduction to static games with incomplete information

2.Dynamic Optimisation:

A. An introduction to economic dynamics
B. Simultaneous systems of differential equations, Stability analysis and linear phase digrams
C. Optimal Control Theory- the maximum principle, Optimisation problems involving discounting.

References:
 Group –A

a) Chiang, A.C.: Fundamental Methods of Mathematical Economics, Third Edition, 2005.
b) Chiang, A.C. and Wainwright, K.: Fundamental Methods of Mathematical Economics, Fourth Edition, McGraw-Hill, 2005.
c) Intrilligator: Mathematical Optimization and Economic Theory, Prentice Hall, 1971.
d) Dorfman, R. Samuelson, P. and Solow, R.: Linear Programming and Economic Analysis, McGraw-Hill Book Company, 1958.
e) Mapa, S. K.: Introduction to Real Analysis, Sarat Book Distributors, Fourth Edition, 2004.
f) Henderson, J.M. and Quandt, R.E.: Microeconomic Theory: A Mathematical Approach, 3rd Edition, McGraw-Hill Book Company, 1980.
g) Sydsaeter, K. and Hammond, P.: Mathematics for economic analysis, Pearson Education, 2002.
h) Bartle, R. G. and Sherbert, D. R.: Introduction to Real Analysis, John Wiley, NewYork, Third Edition.
i) Dixit, A: Optimization in Economic Theory, Oxford University Press, 1976.
j) Blume, L. and Simon, C.: Mathematics for Economists, Norton, 1994.

Group -B

a) Gibbon Robert , Game Theory for Applied Economists, Princeton University Press 1992.
b) Gibbon Robert,A primer in Game theory, Harvester Wheat sheaf London 1992.
c) Aliprantis C. D.   and S.K. Chakraborty ,Games and Decision Making , Oxford University Press
d) Binmore Ken,Game Theory -A Very Short Introduction , OUP,2007 .
e) Luce R D and H Raffia ,Games and Decisions, John Wiley and Sons, 1957.
f) Myerson R.B. ,Game Theory – Analysis of Conflict, Harvard Univesity Press, 1991
g) G. Owen , Game Theory, Academic Press 1991.
h) Mas-Colell A., M.D. Whinston and J R Green ,Microeconomic Theory, OUP
i) Varian H R , Intermediate Micro Economics , W. W. Norton & Company; Eighth Edition edition (December 3, 2009).
j) Eric Rasmusen, Games and Information: an introduction to Game Theory , Blackwell Publishing,2001.
k) Chiang, A.C., Fundamental Methods of Mathematical Economics, McGraw-Hill, 2005.
l) Chiang, A.C., Elements of   Dynamic Optimisation, McGraw-Hill, 1993.
m) Shone Ronald, Economic Dynamics, Cambridge University Press,1997.
n) Michael Hoy, John Livernois, Chris McKenna, Ray Rees, Thanasis Stengos: Mathematics for Economics, The MIT Press,Third Edition, 2011.

SEMESTER- II

Paper V (ECO 201): Macroeconomics I [Macroeconomic Theory]
50 Marks

Group A: 25 Marks (Written -20, Internal Assessment -05)

1. Evolution of Macroeconomic Theories: General Equilibrium Theory, Keynesian economics, Post-Keynesian Developments: New Keynesian Macroeconomics, New Classical Macroeconomics, Rational Expectations, Disequilibrium Macroeconomics etc.

2. Macroeconomic Models of Aggregate Supply
Sticky Wage Model (New Keynesian Model), Sticky Price Model (New Keynesian Model), Imperfect Information Model (New Classical Model), Workers' Misperception Model (New Classical model)

3. Real Business Cycles and New Keynesian Economics
Real Business Cycle Models: Central Features, A Simple Real Business Cycle Model, Effects of a Positive Shock to Technology, Macroeconomic Policy in a Real Business Cycle Model.
New Keynesian Economics (atleast one in detail): Sticky Price (Menu Cost) Model, Efficiency Wage Models, Insider-Outsider Models and Hysteresis.

4. Disequilibrium Macroeconomics (at least one of the following will be taught in detail)

1. Disequilibrium model of Clower,
2. Disequilibrium model Barro-Grossman,
3. Disequilibrium model Malinvaud and Benassy.

Group B: 25 Marks (Written -20, Internal Assessment -05)

5. A Brief Account of Monetary Economics
(i) The Quantity Theory Approach to Monetarism
(ii) Phillips Curve and the Natural Rate of Unemployment Hypothesis
(iii) Money Demand under Hyper inflation-The Cagan Model
(iv) Rational expectation and monetary policy: Solving a rational expectation model with money and policy irrelevance- Problem of time inconsistency and rule versus discretion: basic issue.
(v)) Monetary policy under Neo Classical and New Keynesian Phillips Curve with an application to Price Level and Inflation Targeting.

6.Open Economy Macroeconomics

1. Basic Accounting: Balance of Payments Accounts; National Income Accounting in Open Economy;
2. Role of Devaluation & Commercial Policies in a Simple Keynesian Model;
3. Monetary approach to Balance of Payments: The Basic Model with One Good & Money; Adjustment Process & Devaluation; Money, Home Goods & Traded Goods;
4. Mundell –Flemming analysis: Stabilization policies under Fixed and Flexible Exchange Rate;
5. Expectations & Exchange Rate Dynamics

References:
a) Barro, R.J. and Grossman, H.I. (1971), "A General Disequilibrium Model of Income and Employment", *American Economic Review*, 61, 82-93.

b) Barro, R. and Sala-I-Martin, (2004): Economic Growth, 2nd Ed, MIT Press.

c) Benassy, J.P. (1986), "Macroeconomics: An Introduction to the Non-Walrasian Approach", *Academic Press*, New York.

d) Cagan P. (1956), 'The Monetary Dynamics of Hyperinflation', *Studies in the QuantityTheory of Money*, edited by Milton Friedman, Chicago, pp. 25-117.

e) Clower, Robert, W. (1969), "The Keynesian Counter-Revolution: A Theoretical Appraisal, in Clower, R. W., ed., *Monetary Theory*, London Penguin Books.

f) Dornbusch, R (1980), *Open Economy Macroeconomics*, Basic Books, New York.

g) Friedman, & Hahn (1990), *Handbook of Monetary Economics, Vols. 1 and 2*, Elsevier, North Holland .

h) Friedman, B.N. & Michael Woodford (2010), *Handbook of Monetary Economics, Vols. 3*, Elsevier, North Holland

i) Froyen, R.T.: Macroeconomics Theories and Policies, Pearson Education, 7th edition.

j) Mankiw, N.G. (1990), "A Quick Refresher Course in Macroeconomics", *Journal of Economic Literature*, American Economic Association, 28(4), 1645-60, December.

k) Mankiw ,N.G. (2000), *Macroeconomics*, Fourth Edition, Harvard University Press.

l) Obstfeld, M. and K.S. Rogoff (1998), *Foundations of International Macroeconomics*, MIT Press.

m) Stiglitz, Joseph E. (2011), 'Rethinking of Macro Economics: What Failed, and How to Repair It', Journal of the European Economic Association, August 2011.

n) Walsh (1998): Monetary Theory and Policy, MIT Press

Paper VI (ECO202): Macroeconomics II [Growth Economics]
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)

Growth models — Harrod and Domar; Instability of equilibrium — Neo-classical growth models — Solow and Meade, Mrs. Joan Robinson's growth model; Growth models of Kaldor and Pasinetti, two-sector model of Ujawa; Technical progress of Hicks, Harrod; Divergence and Convergence of Growth.

Group –B: 25 Marks (Written -20, Internal Assessment -05)

Solow Growth Model – Steady State Growth, Inada condition, Conditional and Absolute Convergence. Endogenous Growth Models – (a) Endogenous Growth with human capital formation – one sector model.(b) Endogenous growth with technological change. (c) Barro's endogenous growth with government spending.(d) Endogenous growth with natural or conservation capital,
Overlapping Generations Model,
Real Business Cycles

References :

Group - A
a) Sen, A.K. (1990), *Growth Economics*, Penguin Books.
b) Barro, R. and Sala-I-Martin, (2004*), Economic Growth (2nd* Ed), McGraw-Hill.
c) Jones, Charles. I (2002), Introduction to Economic Growth , W.W. Norton.
d) Solow R.M. (2000*), Growth Theory- An Exposition (* 2nd Ed), OUP,
e) Romer, D. (2001), *Advanced Macroeconomics (2nd Ed)*, McGraw-Hill.
f) Robert J. Barro and Xavier Sala-i-Martin (1992), 'Convergence', *Journal of Political Economy*, Vol. 100, No. 2 , pp. 223-251.
g) Young, Higgins and Levy (2008), 'Sigma Convergence versus Beta Convergence', *Journal of Money, Credit and Banking,* Vol. 40, No. 5.

Group -B
1. Barro and Sala-i-Martin,' Economic Growth', Mc.Graw Hill, 2004, 2nd ed.
2. David Romer, Advanced Macroeconomics, Mc.Graw Hill, 2001, 2nd ed.
3. Charles Jones,'Introduction to Economic Growth', W.W. Norton & Co. 2nd ed.
4. Paul M. Romer,'Endogenous Technological Change', JPE, 1990, Vol. 98
5. Donna Ramirez Harrington, Madhu Khanna and David Zilberman,' Conservation Capital and Sustainable Economic Growth', Oxford Economic Papers, 2005, Vol. 57
6. Robert J. Barro, 'Government Spending in a Simple Model of Endogenous Growth', JPE, 19990, Vol. 98

Paper VII(ECO-203): Environmental Economics, Public Choice and Public Economics
50 Marks

Group A: Environmental and Resource Economics: 25 Marks (Written -20, Internal Assessment - 05)

1. Public goods and environmental goods, Economy-Environment Interaction
2. Valuation of environmental goods.
3. Market and non-market instruments for pollution control, their relative effectiveness in LDCs
4. Economic Growth and Sustainable Development
5. Renewable Resource Management
6. Exhaustible Resource
7. Common Property Resources
8. Environmental Resource Accounting

Group B: Public Choice and Public Economics: 25 Marks (Written -20, Internal Assessment -05)

1. Collective decision making - voting, Arrow's Impossibility Theorem, characteristics of majority voting rule.
2. Theories of public expenditure and economic growth
3. Tax theory, optimal taxation
4. Fiscal Federalism -Theory and problems; Problems of Centre-State Financial relations in India

References:

a) Kolstad C D- Intermediate Environmental Economics, Oxford University Press, Second Edition, 2011.
b) Berck P and G. Helfand, The Economics of the Environment, First Edition, Addison-Wesley, 2011.
c) Hanley N., F. Shogran and B. White, Environmental Economics in Theory and Practice, McMillan, 2004.
d) Hanley N., F. Shogran and B. White, An Introduction to Environmental Economics , OUP, 2004.
e) Pearce D.W. and R.K Turner, Economics of Natural Resources and the Environment, Harvester Wheatsheaf. 1991.
f) Mueller D., Public Choice-II, Cambridge University Press; 2 edition, 1989.
g) Cullis John and Phillip Jones , Public Choice and Public Finance, Oxford University Press,2010.
h) Stephen Smith, Environmental Economics – A very short introduction, OUP, 2011.
i) Wills Ian, Economics and the Environment, Allen and Unwin, 2007.
j) Devarajan S, Swarup V and Zou H(1996), 'The Composition Public Expenditure and Economic Growth', Journal of Monetary Economics, 37.

Paper VIII (ECO – 204) Quantitative Economics II [Statistics and Econometrics]
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)

1. Sampling and Sampling Methods, Sampling distributions of statistics.
2. An Introduction to Classical Inference Estimation and Hypotheses Testing; point and interval estimation; Tests of significance.
3. Frequency **χ2**: Goodness of Fit, Test of Homogenity, Test of Independence.
4. Analysis of Variance: One way & Two way analysis.
5. Two variable linear models- the linear specification; basic assumptions; least square estimators and their properties; tests of goodness of fit; inference in the least square model

Group –B: 25 Marks (Written -20, Internal Assessment -05)

1. General linear model: OLS Estimators and their properties; tests of goodness of fit; inference in the OLS model,
2. Some econometric problems:
3. A. Multicolinearity, heteroscedasticity, and auto-correlation (basic concepts, problems and remedial measures only)
   B. Dummy variables- Nature and use of dummy variables; case of dependent dummy variables, Dummy variable trap.
4. Simultaneous equations Models: Structural and Reduced form equations; identification problems.

References

a)   Goon, Gupta and Dasgupta- Fundamentals of Statistics
b)   Mathai A. M & Rathie P. N- Probability & Statistics
c)   Maddala, G.S. Introduction to econometrics
d)   Kmenta, J. Elements of Econometrics
e)   Johnston, J. Econometric Methods
f)   Gujarati,D.N. Basic Econometrics

Post-Graduate Syllabus in Economics with Rural Development
SEMESTER- III
(Special Papers: Econometrics or Agricultural Economics)

(Special Paper: Econometrics)

Paper – IX (ECO 301E): Econometrics I
50 Marks

Group A :   25 Marks (Written -20, Internal Assessment -05)

1. Violation of Assumptions in Classical Linear Regression Model- Non-Zero Mean; Non-Normality; Autocorrelation-Causes, Consequences, Tests and Remedies; Heteroscedasticity-Causes, Consequences, Tests and Remedies; Stochastic Regressors- Large Sample Properties, Method of Moments, Instrumental Variable Estimation Method; Multicollinearity- Causes, Consequences, Tests and Remedies.

2. Model Specification and Diagnostic Testing-Model Selection Criteria, Consequences and Tests of specification error, Nested and Non-Nested Models.

GROUP-B: 25 Marks (Written -20, Internal Assessment -05)

3. Maximum Likelihood Estimator- Interpretation, Estimators for 2 Variable model, Properties of the Estimators, Extension to the K Variable CLRM and Generalised Regression Model, Interval Estimation and Hypothesis Testing, Distinction between Restricted and Unrestricted Maximum Likelihood Function, Likelihood Ratio Test.

4. Tests of Structural Change – The Chow Test, CUSUM, CUSUMSQ.
   Dummy variables- Estimation and Interpretation, Dummy Variable Trap, Interaction Effect.
   Application of Dummy Variable (atleast one)- Seasonal Analysis, Limited Dependent Variable model, Least Squares Dummy Variable (LSDV) model in Panel Data Analysis, Structural Break Analysis.

References:

a) Gujrati, D.: Basic Econometrics, Mc Grawhill Higher Education, 2003.
b) Judge, G.G., Hill, R.C., Griffiths, W.E.: Learning and Practicing Econometrics, Wiley, New York, 1993.
c) Maddala, G.S.: Introduction to Econometrics, 3rd edition, John Wiley & Sons Ltd, 2005.
d) Johnston, J.: Econometric Methods, 3rd Edition, McGraw-Hill/Irwin; 4th edition, 1996.
e) Greene, W.H.: Econometric Analysis, 4th edition, Pearson Education, 2000.
f) Judge, G.G., Hill, R.C., Griffiths, W.E, Lütkepohl,H., Lee,T.: Introduction to the Theory and Practice of Econometrics, Wiley, New York, Second Edition.
g) Johnston, J. and Dinardo, D.: Econometric Methods, Fourth Edition, McGraw-Hill, 2006.
h) Wooldridge, J.W: Introduction to Econometrics, South-Western, Division of Thomson Learning; International ed edition, 2005.
i) Kmenta, J. : Elements of Econometrics, Macmillan Publishing company, 1991.
j) Intriligator, M.: Econometric Models, Techniques and Application, Prentice Hall, Private India Ltd, New Delhi, 1980.
k) Perron,P.: The Great Crash, The Oil Price Shock and The Unit Root Hypothesis", Econometrica, vol.57 (6), pp1361 to 1401, 1989.

Paper – X (ECO 302E): Econometrics II
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)

1. Univariate Time Series Modelling,
   AR,MA and ARIMA Process

2. Test of Stationarity – Unit Root Test, Augmented Dickey Fuller Test
   Non Stationary Series: Integrated Series

3. Distributed Lag Model
   Autoregressive Distributed Lag Models
   Exogeneity
   Cointegration and Error Correction

4. Modelling Volatility: ARCH Models

Group –B :   25 Marks (Written -20, Internal Assessment -05)

Panel Data
1. Sources and Types of Panel Data
2. Advantages and Disadvantages of Panel Data.
3. Panel Data Regression Model-Simplest Case
4. Two Extension of Simple Model- Fixed Effects Model (FEM)   v/s   Random Effects Model (REM)
5. Estimation of REM The Fixed Effects Model: One way and Two Way Classifications
6. Estimation of FEM-by Lest Square Dummy Variable Method (LSDV)
7. The Within-and-Between-Groups Estimators
8. Dynamic Panel Data Model (Simple version)

References :

a) Johnston & Dinardo (2006), *Econometric Methods*, McGraw Hill International Edition.
b) Green (2009), *Econometric Analysis*, *Pearson Education*.
c) Baltagi (2008), *Econometric Analysis of Panel Data*, John Wiley.
d) Wooldridge (2002), *Econometrics Analysis of Cross Section and Panel Data*, MIT-Press, Cambridge.
e) Enders, Walter (2004):*Applied Econometric Time Series*, John Wiley.
f) Maddala (2009), *Introduction to Econometrics*, John Willy and Sons (Asia) Pte. Ltd.

Paper – XI (ECO 303E): Econometrics II
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)
1. Generalised Linear Regression Model and Its Applications
1.1. Generalised Linear Regression Model
1.2. Pooling of Cross Section and Time Series Data
1.3. Seemingly Unrelated Regression
2. Generalised Method of Moment and its estimation.

Group –B: 25 Marks (Written -20, Internal Assessment -05)
1. Principal Component Analysis.
2. Limited Dependent Variables – Linear Probability Model, Logit Model, Probit Model and Tobit Model
3. Simultaneous Equation Methods: Single Equation Methods of Estimation –OLS, ILS, LIML, 2SLS; System Methods of Estimation – 3SLS, FIML

References :

a) Kementa J., Elements of Econometrics, Macmillan Publishers Limited, 1986
b) Johnston & Dinardo (2006), *Econometric Methods*, McGraw Hill International Edition
c) Green W H (2009), *Econometric Analysis*, Pearson, 2007
d)   Johnston J. *Econometric Methods,* McGraw-Hill Inc.,US, 1984
e) Koutsoyiannis A., Theory of Econometrices, Palgrave Macmillan Limited, 2001.
f) Maddala G S, Introduction to Econometrics, Wiley India Pvt. Ltd, 2012.
g) Pindyck R.S. and D.L. Rubinfeld, Econometric Models and Economic Forecasts, Mc-GraW Hill International Edition.
h) Richard A.J. and D.W. Wichern, Applied Multivariate Statistical Analysis, Pearson Education.
i) Hair, Black, Babin, Anderson and Tatham, Multivariate Data Analysis, Pearson Education
j) D Gujrati and Sangeetha, Basic Econometrics, The McGraw Hill Companies, Fourth Edition
k) Michael D. Intriligator, Econometric Models, Techniques, and Applications, Prentice Hall, 1995

Paper – XII (ECO 304E): Econometrics II
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)
Application of Econometric Models:
Application of Single Equation Estimation:

1. Application to Households – Demand Analysis, Consumption Function Estimation, Family Budget Studies & Engels Law.
2. Application to Firms – Production Function and Cost Functions, Growth & Profitability, Employment Function and Economic Capacity Utilisation.
3. Application to Money Market – Demand for Money
4. Application to Labour Economics.
5. Estimation of Investment and Consumption Function.
6. Estimation of Export-Import Function

Group –B: 25 Marks (Written -20, Internal Assessment -05)

Application of Simultaneous Equation Estimation: Application to Macroeconometric Model:

1. The Klein – Goldberger Model
2. The MPS Model
3. The DRI Model
4. The Trends in Macroeconometric Model Construction
5. Simultaneous – Equations Models of money Demand and Supply.
6. System of Demand Equations- Linear expenditure system.
7. RBI-MSE Macro Model for Indian Economy.

References:

Michael D. Intriligator, Econometric Models, Techniques, and Applications
Julia Hebden, Applications of Econometrics
M. Desai, Applied Econometrics
Kerry Patterson, An Introduction to Applied Econometrics – A Time Series Approach

Paper – IX (ECO 301A): Agricultural Economics I
50 Marks

Group A: 25 Marks (Written -20, Internal Assessment -05)

1. Agrarian Questions and Differing forms of Capitalist Agrarian Transition; Mode of Production in Agricultural sectors; Classification of farmers.

2. Peasant Economy – Chayanov's Approach to peasant farming; Profit maximizing peasant, Risk averse peasants, Drudgery Averse Peasants, Share cropping peasants, peasant technology adoption; Intra-household relationship in peasant economy and women in peasant farming.

3. Structure of backward agriculture; Analysis of stagnation in agriculture; Structure of landed property and non-land assets with reference to capital formation.

Group B: 25 Marks (Written -20, Internal Assessment -05)

4. Agricultural development and rural markets; Theory of interlinkages transactions and interlikages of rural markets.

5. Agricultural planning and polices in the third world countries: Some theoretical aspects of Agricultural policies.

6. Different Paradigms in Development theory: Plea for labourist approach in agricultural development.

References:

a) Alexandrates, N. (1988), *World Agriculture: Towards 2000*, Belhaven Press, London.

b) Basu, K. (1990), *Agrarian Structure and Economic Development*, Hardware Economic Publisher.

c) Basu, K. and P. Nayak (1992), *Development Policy and Economic Theory*, Oxford University Press, Oxford.

d) Basu, K.(1994), *Agrarian Questions*, Oxford University Press, New Delhi.

e) Basu. K.(1997), *Analytical Development Economics*, Oxford University Press, New Delhi.

f) Bhaduri, A.(1983), *The Economic Structure of Backward Agriculture*, Macmillan India Limited.

g) Bharadwaj, K.(1994), *Accumulation, Exchange and Development*, Sage Publications India, New Delhi.

h) Byres,T.J.(1997), *The State, Development, Planning and Liberalisation in India*, Oxford University Press, New Delhi.

i) Ellis, F. (1988), *Peasant Economics*, Cambridge University Press, Cambridge.

Paper – X (ECO 302A): Agricultural Economics II
50 Marks

Group –A: 25 Marks (Written -20, Internal Assessment -05)

1. Structure of Backward Agriculture –Causes of low investment and low productivity.
2. Risk and Uncertainty in Production- input related risk and risk aversion. Adoption of modern technology under production uncertainty.
3. Optimal use of natural resources and sustainable growth in agriculture. Problem of Soil degradation and water management.
4. Public Policy for Agricultural Growth and resource management.

References:

a) R.E. Just and R.D. Pope, "Stochastic Specification of Production Function and Economic Implications" Journal of Econometrics, 1978,Feb
b) Gershon Feder, " Farm Size, Risk Aversion and the Adoption of New Technology under uncertainty, OEP, 1980, July
c) R.U. Goetz, "Diversification in Agricultural Production : A Dynamic Model of Optimal Cropping to manage Soil erosion", AJAE, 1997,79
d) F.A. Shah, D. Zilberman and U, Chakraborty, "Technology Adoption in the presence of an exhaustible resource: The case of ground water extraction", AJAE, 1995,77.
e) Joydeb Sasmal,"Resource and Technology as constraints to growth in agriculture: The Indian Experience" Conference volume,International Journal of Arts & Sciences ,Paris,2012

Group –B: 25 Marks (Written -20, Internal Assessment -05)

1. Theory of Agrarian Institutions----a) Tenancy, Rent, Cost & Risk sharing b) Credit market imperfection
2. Role of Agricultural Marketing ---Structure of markets and the role of Oligopsony.
3. Pricing of Agricultural Commodities
4. Role of information technology and agricultural marketing

References:
a) Koushik Basu " Analytical Development Economics", Oxford
b) R.T. Rogers and R.J. Sexton, "Assessing the Importance of Oligopsony Power in Agricultural markets" ,AJAE, 1994,76.
c) W.H. Nicholls, "Imperfect Competition in Agricultural Industries", in H.G. Halcrow(ed) Agricultural Economics
d) S. Thompson and S. T. Sanka ,"Potential effects of information technologies on the economic performance of agricultural and food markets",AJAE,1997,79
e) Pranab Bardhan (ed) " The Economic Theory of Agrarian Institutions" Clarendon Press Oxford 1989
f) Abhirup Sarkar, "On the formation of Agricultural price", Journal of Development Economics,1993, Vol.41.
g) Joydeb Sasmal, "Agricultural Price and Price Policy------" Artha Beekshan 2003 ,June.
h) P.K. Bardhan and T,N. Srinivasan, " Crop sharing in Agriculture-A Theory and Empirical Analysis", AER, 1971.

Paper – XI (ECO 303A): Agricultural Economics III
50 Marks

Group A: Analysis of Agricultural Production Behaviour :   **25 Marks (Written -20, Internal Assessment -05)**

1. Production function analysis in agricultural production behaviour, Economics of supply of agricultural products. Theories of marketable and marketed surplus.
2. Theory of demand for agricultural products. Price and income elasticities of demand for agricultural products, factors affecting demand for agricultural products with particular reference to India.
3. Pricing of agricultural products- intertemporal behaviour of prices, pricing efficiency, instability in agricultural prices-speculative and forward markets.
4. Agricultural marketing –Marketing efficiency, Marketing margins, price spreads, market infrastructure.

Group B: Farm Management :   **25 Marks (Written -20, Internal Assessment -05)**

1. Farm Management – Meaning and scope, economic principles applied to farm management
2. Farm Planning – Good farm plan, farm budgeting
3. Applications of operation research techniques in farm management: linear programming
4. Management of farm resources

Reference:

a) K. L. Krishna, Econometric Applications in India, OUP.
b) A.N. Sadhu and A.Singh, Fundamentals of Agricultural Economics, Himalaya Publishing House
c) Schmidt P, 1986, Frontier Production Functions, Econometric Reviews, 4,
d) Richard T. Woodward, John B. Penson, C. Parr Rosson, Oral T. Capps, Introduction to Agricultural Economics Pearson (2009), 5th Edition
e) S.Ghatak and K.Insergent, Agriculture and Economic Development by, Select Book Service Syndicate, 1984.
f) World Bank 1996. Managing price risks in India's liberalized agriculture: can futures markets help? Report No.15453-IN. Washington, DC., World Bank.
g) Vijaya Bhaskar, P. & Mahapatra, P. 2003. Derivatives simplified: an introduction to risk management. New Delhi, India, Response Books.
h) Myong Goo Kang and Nayana Mahajan, An introduction to market-based instruments for agricultural price risk management, Agricultural Management, Marketing and Finance Service (AGSF) ,Agricultural Support Systems Division,FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS,Rome, 2006.
i) S S Acharya and N.L. Agarwal (1994), Agricultural Prices- Analysis and Policy, Oxford and IBH, New Delhi.
j) Munish Alagh, Agricultural Prices in a Changing Economy, Academic Foundation, New Delhi.
k) A. A. Rane, A. C. Deorukhkar, Economics of Agriculture, Atlantic
l) Rosson C. Parr III, Capps Oral Jr., Penson John B. Jr., Introduction to Agricultural Economics, Prentice Hall.
m) S.S. Reddy , P. Raghu Ram, TVN Sastry, Agricultural Economics, Oxford and IBH Publishing Co. New Delhi

Paper – XII (ECO 304A): Agricultural Economics IV
50 Marks

Group –A :　25 Marks (Written -20, Internal Assessment -05)

1. Growth and Fluctuation in Indian Agriculture since Independence.
2. Growth and Equity in Indian Agriculture.
3. Farm size, Productivity and Efficiency in Indian Agriculture.

Suggested readings:
  a) Gulati, A., Mauruce R. Landes, Ganguly, K.: Indian Agriculture: Managing Growth with Equity, A publication of the Agricultural & Applied Economics Association, 2009.
  b) Dandekar, M.L.: Growth and Equity in Agriculture, International Journal of Agricultural Economics, 1987.
  c) Shah, C.H.: Growth and Inequality in Agriculture, International Journal of Agricultural Economics, 1986.
  d) Sen, A.K. and Rudra, A. : Farm size and labour use: Analysis and policy, Economic & Political Weekly, *Vol. 15, Issue No.5-6-7, February 16, 1980.*
  e) Rudra, A.: Indian Agriculture: Mythes and realities, 1984.
  f) Ramesh Chand, P A, Lakshmi Prasanna, Aruna Singh: Farm Size and Productivity: Understanding the Strengths of Smallholders and Improving Their Livelihoods, Economic & Political Weekly Supplement, June 25, 2011, vol. XLVI, nos. 26 & 27.

Group –B :　25 Marks (Written -20, Internal Assessment -05)
1. Institutional aspects of agricultural development in India.
2. Labour absorption and employment in Indian agriculture.
3. Price and terms of trade.
4. Role of FDI in agriculture with particular reference to developing economies

Reference*:*

a) Asoke Rudra, *Indian Agriculture : Mythes and realities*, 1984.
b) P.C.Joshi, *Institutional aspects of agricultural development,* 1987.
c) A.Baidyanathan, Labour use in rural India, *EPW*.
d) Anne Booth and R.M.Sundaram, *Labour absorption in agriculture.*
e) P. Das, Rural Non-Farm Employment in India, 2011
f) A.K.Sen, *Employment, technology and development*.
g) P.K.Bardhan, Rural unemployment, wages and labour markets in India *EPW*, Jun 25, Jul 2&9, 1977.
h) A.Mitra, *Terms of trade and class relations.*
i) B.S.Tyagi, Farm price and class bias in India, *EPW*, Sep 1979.
j) Kahlon and Tyagi, Intrasectoral terms of trade, *EPW*, Dec. 1980.
k) Nalini Vittal, Intersectoral terms of trade and method, EPW, 1993

Paper – XIII (ECO-401): Rural Development: Theory and Experience

Group –A :   25 Marks (Written -20, Internal Assessment -05)
1. Concept of and Rationale for Rural Development, Approaches to R.D. Problems.
2. Agriculture – industry interaction, Nurkse, Rains-Fei & other theories.
3. A survey of contemporary rural sectors with special reference to poverty, income inequality & unemployment, rural indebtedness & environment.
4. Decentralised planning experiences in India.

Group- B :   25 Marks (Written -20, Internal Assessment -05)
5. Review of progress in rural industrialisation and rural non-firm employment in India.
6. Rural Informal Sector and Social Protection
7. Evaluation of policies and programmes for rural development.
8. Food security and commercialization in India.

References *:*

a) V. M. Dandekar and N. Rath, Poverty in India.
a. K. Sen, Poverty and Famine-An Essay on Entitlement and deprivation.
b) Raj Krishna, 'Rural Unemployment : A Survey of Concepts', in C.H. Shah (ed), Agricultural Development in India : Policy and Problem.
c) S. Sau, 'Integrated Rural Development Programme in West Bengal; An Appraisal in all-India Perspective,' Economic Development Review, Volume I,   1990.
d) V.M. Rao, 'Evolution of rural development programmes in India', in U.G. Jha (ed),Rural Development in India Problems and Prospects, Anmol publications   Pvt. Ltd., 1999.
e) Das, P., *Rural Non-Farm Employment in India*, Pattern of Growth and Determinants, Firma KLM Pvt. Ltd., 2011.
f) S. Mukhopadhyay & C.P. Lim, Rural non-farm activities in the Asian region: An Overview from S. Mukhopadhyay & C.P. Lim (ed) 1985.
g) Srivastava, R. (2011), 'Social Protection for Workers in India…', Keynote paper, 53rd Conference, ISLE.
h) Kanan, K.P., Sribastava, Sengupta (2006), 'Social Security for unorganised sector: A major national initiative', EPW, August 12.
i) NCEUS (2007), 'Social security for Unorganised Workers', New Delhi, May.
j) NCEUS (2009), 'The Challenge of Employment : An informal economy perspective', Government of India and New Delhi: Academic Foundation.

Paper – XIV (ECO-402): International Trade and Finance
50 Marks

Group –A: International Trade :   25 Marks (Written -20, Internal Assessment -05)

1.International Trade Theory: (a) Heckscher-Ohlin Theory, Stolper -Samuelson theorem and Rybczynski Theorem (b) Market Structure, Monopolistic Competition and International Trade.

2. International Trade Policy:
(a)Trade policy with domestic distortions : Non-optimality of free trade, optimal trade policy and the theory of the second best; The infant industry argument

(b)Theory of tariff: Tariff in a partial equilibrium framework: tariff and protection; revenue effect of tariff; deadweight loss from tariff ; Tariff in a general equilibrium framework: tariff and welfare, optimal tariff, maximum-revenue tariff, Metzler's paradox, equivalence between export and import tax; Tariff and income distribution: short run and long run effects of a tariff, the political economy of protection; Tariff and traded inputs: the effective rate of protection (ERP), calculation of the ERP, the content protection scheme.

(c)Economic Integration: Regional Blocks; GATT, WTO and the Less Developed Countries**.**

Group –B: Finance :   **25 Marks (Written -20, Internal Assessment -05)**

1. Financial instruments- Bonds, stocks, mortgages and derivatives; Primary and secondary stock markets,
2. Corporate financial statement analysis.
3. Portfolio Management-Concept of Fundamental Analysis, Technical Analysis, Efficient market Theory; Portfolio Analysis and Portfolio Selection, Capital Asset Pricing Model.

4. Techniques of Capital Budgeting- Capital Budgeting Process, Project Classification, Investment criteria, Net Present Value, Benefit Cost Ratio, Internal Rate of Return.

References
Group A:

a) Bhagwati, J., A. Panagariya and T.N. Srinivasan (1998) , *Lectures on International Trade*, MIT Press.

b) Caves, R.E., Frankel, J.A. and Jones, R.W. (1996), *World Trade and Payments- An Introduction*, 5th Edition, Scott, Foresman/Little Brown Higher Education.

c) Helpman E. and P.R. Krugman (1989), *Trade Policy and Market Structure*, MIT Press.

d) Krugman, P.R. and M. Obstfeld (2006) International Economics: Theory and Policy, 6th Edition, Pearson Education Delhi.

e) Sodersten, B. and R. Geoffrey (1994), *International Economics*, 3rd Edition, Macmillan London.

a)   R.W.Jones,"The structure of simple general equilibrium models ",JPE,1965
E. Helpman and P. Krugman:Market Structure and Foreign trade,MIT Press,1985

References
Group B

a) Stephen A. Ross, Randolph Westerfield, Bradford D. Jordan: Fundamentals of Corporate Finance, Richard D Irwin, 1998.
b) Damodoran A., Valuation: Security Analysis for Investment and Corporate Finance, John Wiley and Sons, 2006.
c) Francis, J.C. Investments- Analysis and Management, McGraw-Hill, 1991.
d) Chandra, P.: Financial Markets, Tata McGraw-Hill Education, Second edition, 2008.
e) Farrell, Jr. J.L., Portfolio Management, Theory and Application, Second edition, McGraw-Hill, 1997.
f) Kevin, S.: Portfolio Management, Prentice Hall of India, 2001.

Paper – XV (ECO-403): Computer Application in Economics
50 Marks (Theory 30, Practical 20)

1. Fundamentals of Computer
   Computer Hardwares; CPU, Key Board, Hard Disc, Magnetic Tape, Floppy, Computer Disc, I/O Devices Printer.
   Computer Processing principles: Binary system properties, Binary operations, Decimal system and its relation with Binary system, ASCII codings.

2. Computer operating systems
   (A) MS DOS Files and directories creation, Debtion, Maming, Renaming, Copying etc. Hard-Disc Management.
   (B) WINDOWS 95: Operation of files in WINDOWS 95 system. Transformation from one system to other.

3. Use of Computers through programmes:
   Computer Languages: Basic, Fortran, Pascal, C etc. (any one) :some simple programming with relevant logarithms (Sorting. Calculation of A.M., S.D., simple regression etc.).

4. Computer Packages (at least 2 packages)
   (i) Worksheet structure, Manipulation of rows and columns, using of manus and commands creating graphs and having regression results.
   (ii) HPG for better representation of graphs.
   (iii) Word processor (one word processing package from MS Excel, MS Word)
   (iv) Dbase: Records: Numeric, String, data, dbase command. Preparing reports.

5. Advanced packages (any one)
   SPSS, EVIEWS, TSP, STATA, SHAZAM, LIMDEP, SATISTICA

6. Advanced topics in Economic Application (any one)
   (i) Maximum likelihood.
   (ii) Non linear Estimations
   (iii) Time series analysis – AR, MA, ARMA. AND ARIMA.
   (iv) Principal Component
   (v) Conditional correlation
   (vi) Forecasting and simulations
   (vii) Algorithms for least square regression (multivariable).

References:

a. M. Morrismand - – Digital Logic and Computer Design
b. Byron S. Gettfied – Theory and problems of programming with BASIC.
c. N. Kannman & N. Ssubramonium – Exploring your PC with BASIC.
d. M. Pal, Fortran 77, Asian Books Pvt. Ltd, 2003
e. Balagurusami E, Programming in ANSI C, Tata McGraw Hill, 2002.

Paper –XVI (ECO-404): Dissertation

50 Marks (Paper 30, Viva 20)